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the stream as far as the River Tambo, which is a large tributary of the River Ucayali, and which is formed by the junction of the Ene and Perene. Sometimes Subiri navigates the last-named river as far up as the vicinity of Chanchamayo. I was informed by him that the Tambo presents no obstacle in the way of navigation, so that if a regular service were established on the River Ucayali, a passage inland could be effected, by means of the Tambo and Ene, as far as the junction of the Rivers Mantaro and Apurimac—a distance of 32 leagues from the town of Huanta.

METEOROLOGICAL OBSERVATIONS taken in the dwelling of the before-named SUBIRI, opposite the point of Junction of the RIVERS MANTARO and APURIMAC.

Month and Day.	Hour.	Pslcrometer.		Barometer (Gay Lussac) in Millimètres reduced to 0°.	Sky.	Observations.
		Free Centigrade.	Molst Centigrade.			
September.						
23	9·30 A.M.	27·1	26·5	722·20	Sunny	The house of Subiri is situated from 2 to 3 mètres above the level of the river.
23	11·45 A.M.	31·2	30·0	721·10	„	
24	9·0 A.M.	21·8	21·0	722·60	„	
24	10·0 A.M.	26·5	25·4	722·10	„	

Taking the average of the foregoing observations, the altitude of the place in question is 1417 feet, and deducting from same the height of Subiri's house above the level of the river, we find that the altitude of the point of junction of the two rivers is about 1411 feet.

ANTONIO RAIMONDI.

Lima, May 19, 1867.

XVI.—*The Jaxartes or Syr-Daria, from Russian Sources.*

By ROBERT MICHELL, F.R.G.S.

IT is not more, I may say, than ten or twelve years ago that the Jaxartes (or Syr-Daria as it is styled in the vernacular of Central Asiatics and by the Russians) was generally believed to have issued together with the Oxus or Amu-Daria from the Lake Sary-Kul, on the Upland of Pamir, between 73° and 74° of E. longitude from Greenwich, and in about 39° of N. latitude. But this is not astonishing. If we refer to the general geography of Asia, as it was understood five or six years ago, we shall be

no less struck by the discrepancies between facts as then stated and as portrayed on the maps of the present day. Although the sources of the Jaxartes are now pretty well ascertained, and although the entire course of the waters of that river from near Lake Issyk-Kul to the Aral has been revealed to us within the last few years, yet every new Russian map of the country through which it runs shows how much our ideas of its common features are still formed from conjecture.

Russian men of science have long been working in this field, but unfortunately the results of their discoveries are described in a language wholly incomprehensible in Western Europe, so that our latest information is generally referable to three or four years back, and by the time the Russians feel themselves sufficiently secure in their newly-formed province of Turkistan to admit into it any traveller from Western Europe, thirsting for scientific knowledge, the arrears of information gained by the Russians themselves will be enormous; so great, indeed, that we shall never be equal with them in an acquaintance with the country until we have original accounts of travel in our own language.

Indebted as I am in this compilation for materials received, though indirectly, from various members of the Russian Imperial Geographical Society, I must here make a thankful acknowledgment of their assistance. The principal authorities on whom I have drawn are Admiral Boutakof, Colonel Meyer, Professor Maksheyef, and Colonel Poltoratski, besides the '*Russian Military Journal*.' At the same time I am so fully conscious of my inability to handle the subject properly that I ought at the outset to apologise for attempting to do so. But it is a pleasing task, and I am obliged to the Council of this Society for inviting me to write a digest of Russian Accounts of Surveys of the Jaxartes, and of explorations of the adjacent country.

My only claim to the indulgence of the Society rests on a knowledge of Russia and of the Russian language, which has enabled me for several years to follow the progress of the Russians in Central Asia, and to gratify my growing interest in the subject by the study of all that has been written upon it by Russian authorities.

Western Europe and the Indian public are inclined to regard with great jealousy the advances of the Russians in Central Asia and their political relations with the Khanats, and attaching great political importance to their situation, treat as comparatively insignificant the scientific data collected by Russian explorers in those countries. For my own part I would humbly express my belief that the contributions to science which Russian officers and civilians have made since they have been able to

penetrate into the interesting regions of Central Asia, are of greater value and importance than the political side of the question as regards our Indian possessions. It must sooner or later be acknowledged that the scientific results of the recent Russian extensions are of superior interest to all other considerations, not only to us, but to Russia herself, it is difficult to see what other moral or material benefit she can possibly derive from an accession of territory in Central Asia.

Those who form a correct estimate of the power of the Russians to affect us in any way on the North-West frontier of India, and who know the footing on which they stand in relation to the Khivans, Bokharians, Kokandians, and nomads, entertain only a feeling of pleasure at the prospect of comparative well-being now opening before the degraded fanatics of those regions, and they rejoice to see that a large tract of the earth's surface is being cleared of the dark shadows which tyranny and barbarism have so long cast over it. With these feelings, on the other hand, is mingled a not altogether unfounded suspicion that the position of the Russians in Central Asia is extremely precarious. Their position in Turkistan is so isolated, their means of communication with the mother-country so difficult, their forces in the province so slender, whilst the races are so numerically overwhelming, and moreover so mistrustful, treacherous, and fanatical, that they might any day be overtaken by some great calamity.

Impelled by a desire to strengthen their position in Central Asia, the Russians have of late years made such enormous strides in that region that it is time to inquire into the results of their advances from a geographical point of view. They have taken town after town, fort after fort from Kokand, Khiva, and Bokhara, until they have found themselves at a great distance from their former line of frontier. It has been a common phrase among the Russian soldiers in the Steppe that expeditions would have to be sent in search of them, for, from their ceaseless advances, it appeared to them that they were marching to the extreme limits of the earth. It cannot be said, and it is officially denied at St. Petersburg, that the conquest of what is now the province of Turkistan has been effected in pursuance of any line of policy. The respective Governors-General of Orenburg and Western Siberia and the local military commanders have extended their authority step by step until it was found necessary by the Imperial Government to draw a frontier somewhere. Having flanked the Kirghiz Steppes on the East and West, it was deemed necessary to close the frontier by a line from Vernoë to the Jaxartes through Aulïetà. When this was done it was still the argument in all official reports that the inviolability of Russian

territory could not be secured without the capture or demolition of Kokandian strongholds in the vicinity of the new Russian line and the "pacification" of the outlying country and people, and those who were in consequence empowered to act as "circumstances might dictate" pushed on and annexed, and reported afterwards.

With a very slender military force, the Russians have now occupied both banks of the Jaxartes, or Syr-Daria, which borders an area of more than 1,000,000 square versts, or about 143,000 square miles, with a population of about 1,000,000: but besides holding the course of the Jaxartes from the Sea of Aral to Khodjend they have also a triangular slice of Bokharian and Kokandian territory on the South side of the Jaxartes from Khodjend and from Fort Chinaz at the mouth of the Chirchik to Samarcand. The line of Russian picket-posts from Djizak * to Oura-tiupé (135½ miles to the South-East of Djizak) runs along the foot of the Nurataù hills which form the northern boundary of Bokhara proper. From Oura-tiupé the Russian cordon proceeds in a North-Easterly direction to Khodjend by Fort Naù. This triangular projection of outposts from the Jaxartes to the base of the mountains forming the Northern wall of the valley of the Zeravshan entirely closes the mouth of the Ferghanah Valley (or valley of the Jaxartes) which constitutes Kokand, and entirely excludes therefrom the Bokharians. Thus by separating the two Khanats of Bokhara and Kokand, the Russians have prepared the way for dealing separately with both. The trade between Bokhara and the Western Provinces of Khiva has always passed through Kokand and its capital, and through Margilan and Ush, thence over the Kashgar-Davan—a pass in the South-Western extension of the Celestial Mountains, to Osh and Kashgar, and so on to Kuldja and Chuguchak. This trade the Russians have now intercepted.

From Khodjend, which has, it is said, a population of 45,000 to 50,000—a chain of Russian posts extends almost due North to Tashkend along the high road between those two places, the distance from one to the other being about 54 miles. Fort Keleùchi lies midway, on the small river which runs into the Jaxartes parallel with the Angren, and at the head of which is fort Abyk, at the Western base of a spur of the Urtak-taù Mountains. These mountains, it would seem, form a natural barrier between the Russian and Kokandian territories. No doubt all the country to the West of this spur (called the Namangan Range) is now claimed by the Russians through their nominal subjects, the nomads, although the only Russian fort

* Djizak is 80 miles south of Chinaz.

immediately West of the meridian of Tashkend is Niaz-bek, which commands the waters of the Chirchik, or Chatkal, here diverted into a system of irrigation canals on an extensive scale. From Tashkend the road proceeds due North (67 miles) to Chemkend on the Badam River, thence by Tairam and Kara-Murt, across the Tersa River and through a mountain pass between the Karataù and Alexandrovski chain of mountains, to Aùliétá. From this point the Russian military line stretches along the Northern base of the Alexandrovski Mountains to Vernoë, by Merké and Tokmak. The mountainous country between this line on the North and the Jaxartes on the South contains no permanent settlement. It is roamed over by nomad Kirghizes and their herds, and has been pretty well explored by Messrs. Semënof, Severtsof, and others. Between the almost rectangular triangle described by the line from Tashkend to Aùliétá, and from the latter point to the Western extremity of Lake Issyk-kul we find a kind of "No Man's Land," rarely visited by Kokandian "ziaketchis," or collectors of tribute, and freely travelled over by Russian scientific explorers. I may here observe that, according to all accounts, this mountainous district equals, if it does not surpass, in the imposing magnificence of its scenery, anything that is to be seen in Switzerland or the Caucasus. Some of the sights witnessed by Mr. Severtsof and described by him in a highly interesting orographical and geological paper,* are no less astonishing for their wonderful peculiarity than remarkable for their beauty.

The line, then, that may be transversely traced from Khodjend to Issyk-kul, indicates a hiatus between Russia and Kokand devoted only to Kirghizes, travellers, coal and gold seekers, and occasional despairing "ziaketchis."

South-Eastern Frontier.—The Russian frontier line from the East, commencing from the Tarbagatai Mountains, bordering the South-Eastern extremity of the Semipalatinsk region (now included within the new province of Turkistan), passes due South close by Chuguchak, across the Emil River which runs into Lake Ala-kul, then a little to the East of Lake Kikhé-Ala-kul and on towards the Eastern extremity of the Ala-taù Mountains, along which it trends to the frontier post of Borokhudzir, which is situated at the foot of the Southern slope of the Alataù, immediately opposite to the sources, on the other side, of the Kok-Su River, which runs Northwards and continues its course to Lake Balkhash, under the name of the Karatal. From this point of the Alataù the Russian frontier proceeds across a steppe country to a point on the Ili, some little way to the East of the mouth of

* A translation of this memoir will appear in the next volume of the Journal,
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the Naryn, one of its tributaries, leaving that river to the right and running in a zig-zag direction along the ridge of the Kegen Hills, so as to include the valley of the Cholkoda. It then cuts the head waters of the Tekes River from Chinese Tartary, and stretching to the South round the Eastern sides of Sumbé Hill and of Khantengri (an elevation in the Celestial Mountains) it turns off towards the West along the latter chain, and nominally running along the Southern slopes of the Kirghiz Alataù, South of Lake Issyk-kul, finally fades away at the Western extremity of that range of mountains.

Such is the Russian line of frontier in that direction. I will only add that the last point of contact between the Chinese and Russian dominions occurs at the mountain knot from which the Kirghiz Alataù strikes off in an independent chain from the Southernmost extension of the Thian-Shan, and which separation of these two branch systems originates the valley of the Naryn or head main branch of the Jaxartes.*

I. *The Jaxartes, or Syr-Daria.*

The Jaxartes, or Syr-Daria proper, commences from the confluence of the Joloshan, or Gulishan, and Naryn, in the vicinity of Namangan. The Naryn takes its rise in the Southern slopes of the Kirghiz Alataù, and winds through 6° of longitude (79° to 73° E. of Greenwich), rushing with the impetuosity of a mountain torrent through the lovely valley of Ferghanah, fed on both sides by numerous tributary streams of which the most conspicuous, from the North, is the Little Naryn, and at its head the Djungol and the Namangan. Then comes the Joloshan from the South, issuing from Chatyr-kul Lake and draining the slopes of the mountains forming the left side of the river valley; from here the blended waters of the Joloshan and the Naryn flow on under the local appellation of the Syr-Daria.

The head waters of the Syr-Daria are but obscurely known, even to the Russians. In its course through Kokand the river still preserves its character of a mountain torrent. On the left the river is flanked by the South-Western spurs of the Celestial Mountains, which form the water-parting of three river-systems, viz., those of Eastern or Chinese Turkistan, where the Kashgar

* In the autumn of the year 1867, when an envoy from the Ameer of Bokhara arrived at Orenburg to negotiate a treaty, it was proposed by General Kryjanovski to draw a line of frontier between Russia and Bokhara along the ridge of the Snowy Mountains to the South-East of Oura-tiupé, and by the chain walling Shuhr-i-Subz on the North to lake Iskander-kul, the true position of which lake was then, and still is I believe, quite a matter of speculation. From here it was proposed to continue the frontier along the mountains on the North side of the valley of the Zeravshan, then across the Steppes and desert to the Yany-Daria, an arm of the Jaxartes.

and Yarkend Darias flow Eastwards to the Tarim, and of Western Turkistan, which has two systems, one traversing Bokhara in the Zeravshán, the other Kokand, in the Syr-Daria—both pursuing a Westerly course towards the Aral, separated by the Kashgar-Davan and Nuratau Hills, and an ever-widening expanse of desert known as the Kizyl-kum. On the right the Naryn and Syr are bounded by the Kirghiz Alatau and Urtak-tau Mountains, and by an offshoot of the latter, called the Namangan Range. Higher up from Chemkend to Fort Djulek the Syr-Daria is bordered, though at some distance off, by the Karatau Mountains, the extreme North-Western continuation of the Thian Shan; then still on the right by a saline desert plain and the Kara-kum sands.

Admiral Boutakof, who is so well known in connexion with the survey of this river and the Oxus, and who is a gold medallist of this Society, ascended in 1863 to Baidyr-Tugai, situated within the Tashkend district at a distance of 538 miles from Fort Perovski. He believes that the river is navigable for some way beyond that place, basing his assumption on statements made by Kirghizes to the effect that the depth of water from thence to Kokand is such that there are no fords below the latter town, and that the natives are obliged to use boats for the transport of camels. Steamers have, however, subsequently (in 1865) passed up to Chinaz, and from there to Namangan: that is 200 or 250 miles higher still.*

Admiral Boutakof succeeded in surveying and mapping 1003 miles of the course of the Jaxartes, calculating from its mouth.

From the confluence of the Naryn and Gulishan the river flows in a Westerly direction, deflecting a little to the South, and after passing Khodjend, turns abruptly to the North at a place called Kosh-teirmen; from here to Hazret (Turkistan) it runs North and North-West, pursuing this course as far as Yany-Kurgan, situated about midway between Din-Kurgan ($43^{\circ} 51' 59''$ N. lat. and $67^{\circ} 10' 44''$ E. long. of Greenwich) and Ak-Cheganak ($43^{\circ} 57' 14''$ N. lat. and $66^{\circ} 51' 33''$ long. E. of Greenwich); from Yany-Kurgan it inclines gradually to the West, and winds away to the Aral without deviating from this general direction.

From Baidyr-Tangai, in $42^{\circ} 1' 40''$ lat. and $68^{\circ} 8' 17''$ E. long. of Greenwich, the river presents a magnificent mass of water

* I borrow, of course, largely from a short account of the Admiral's survey, given by himself, in which he observes that he has not written a full report of that valuable service. For the loan of that abstract (a translation of which appeared in a published report of the Calcutta branch of the Asiatic Society in 1867), as well as for other materials, I have to express my great obligations to that distinguished and intrepid officer.

running in a single bed. The banks, which are of an argilo-salinous and sandy character—for the most part inundated at high water—are depressed, but abrupt, by the margin of the river, so that the depth immediately under them is one fathom, sometimes even more. There is nothing in them to attract the scrutiny of the geologist. When they are flooded the inundation extends from 500 fathoms to 3 and 5 miles. The swamps so formed are covered with reeds, but after the waters subside the ground affords excellent pasturage to the herds of Kirghiz cattle. Here the Kirghizes take up their quarters for the winter. These meadow-patches are relieved to the eye by occasional sandy hillocks from 30 to 40 feet high, on which grow the Tamarisk, Djida (*Eleagnus Angustifolia*), and Turanga, or "Tatarix." The width of the river from Baıldyr-Tugai to Fort Perovski is from 150 to 400 fathoms; the depth rarely less than 3 and frequently 5 fathoms. The rapidity of the current in the main channel is never less than 3 knots, and it increases even to $4\frac{2}{3}$ (7 versts) miles per hour. The current is strongest at about 10 or 11 o'clock A.M. After that time it decreases in velocity till 2 P.M., when it again begins to run quicker, resuming sometimes in the evening the velocity of the morning. As an instance of the difficulty of making head-way against the stream, it is said that it has taken a fortnight and more for steamers to perform a passage of 67 miles from Fort Perovski to Djulek. But generally speaking, with a fair wind, vessels steam up the river at the rate of 3, seldom 4 versts (2 to $2\frac{2}{3}$ miles) per hour, and down at $6\frac{2}{3}$ and 10 miles in the hour.

The Syr-Daria is covered with ice for nearly 5 months in the year, *i.e.*, from the middle of November to the middle of March. It is flooded from May to the end of June, and again in September, owing to the melting of the snows in the Thian-Shan mountains which occurs at those periods. The superabundance of water in the Syr-Daria depends on the heated state of the atmosphere on the mountains, and on the quantity of snow lying on their surface.

It is feared by many that without the most costly and extensive artificial works the river will never be a practicable water-way, on account of the nature of its bed, which is constantly changing, as well as on account of the tortuosity and velocity of its stream. It is observed that, for one reason or another, the Syr is shallowing year by year. The water is of a muddy yellow colour, but it is soft, and is pleasant to the taste after being allowed to settle. It has the peculiar effect of making the hair fall off the head if it is constantly used in ablutions.

The bottom of the Syr-Daria is chiefly composed of mud and sand. It is, however, rocky (freestone) $3\frac{1}{2}$ miles below Ak-Djar, a little above the parallel of Turkistan. In 1845, Admiral Boutakof struck on a rock on his way to Fort No. 1, and the men who went into the water to shove off the steamer (*Perovski*) brought up from the bottom a piece of wood resembling the tamarix species in a lignite state.

From the mouth of the Arys (an affluent from the North between Chemkend and Turkistan) to Uтч-Kayuk (lat. $43^{\circ} 14' 12''$ and $67^{\circ} 47' 14''$ E. long. of Greenwich) the Syr-Daria winds very tortuously, and gives rise in its passage to a large number of islands, many of which are 2 miles long. On these islands vegetation is much more abundant than along the banks of the river; the "Djida" (*Eleg. August.*) there grows to a height of 4 fathoms, and the "Turanga" swells out to a diameter of 10 inches. The brushwood on these islands is very dense; it is infested, according to the Kirghizes, by tigers and wild boars. Eight miles below Baildyr-Tugai are the ruins of a small Kokandian fort called Bañ-Kurgan, which Kirghiz tradition affirms was demolished about 100 years ago; and 40 miles back up the river on the South bank are to be seen the remains of the town of Tunkat, now called Iskillé, after a saint whose tomb, raised by Tamerlane, is still there.

Beyond the jungle which fringes the river below the mouth of the Arys an open space becomes visible at some 4 or 5 miles from the Syr-Daria, which is studded with clayey sand mounds tufted with a meagre brushwood; they are supposed to have been artificially formed. On a sort of table-land, within 7 miles, in a line almost direct to the North from the mouth of the Arys, are to be seen the remains of what may have been the citadel of the ancient town of Otrar, where Tamerlane died. Lower down, a distance of $84\frac{2}{3}$ miles separates the abandoned Kokandian fort Uтч-Kayuk (or Kaïk) from the mouth of the Arys. Throughout this extent of the Syr-Daria the character of the river and its banks, and of the vegetation along them, is the same as higher up, and islands similar to those before mentioned occur parallel with the shores.

The forts below Uтч-Kayuk are Din-Kurgan, Yany-Kurgan, Djulek and Ak-Mesjed (now Fort Perovski); then follow Chim and Kosh-Kurgans, on the Djaman-Daria, as the river is there called; next, Forts No. 2 and 1; and, lastly, the abandoned Raïm fort at the mouth of the Syr-Daria. The ruins of an old Kokandian fort, Kuliki, are situated on the Kuvan-Daria, 13 miles below the issue of that arm from the Syr. The next are Kumysh Kurgan, also on the Kuvan, 10 miles below Kuliki and

Khodja-Niaz, where the course of the Kuvan terminates in an extensive marsh in the sands of the Kizyl-Kum.

Turkistan (Hazret) is not visible from the Syr, being situated in a hollow of the foreland of the Karataù mountains, on the Initchké rivulet.

From Djulek to Fort Perovski the Syr-Daria makes an endless series of bends, after a large curve to the West and North from Tiumen-Aryk to Djulek, within which the space is known as the Misheùli-Kum Sands.

Djulek stands on the right bank of the Syr. It was erected in 1861. Prior to that period there had been no surveys or "reconnaissances" made above this point; so that when it was resolved by the Russians to occupy it, Captain Meyer was entrusted with a force of about 800 soldiers and Cossacks and 250 armed Kirghizes, with 9 guns, to explore the country and to take and demolish the Kokandian fort of Yany-Kurgan,* 48½ miles above Djulek in a straight line. This he accomplished in the marvellously short space of three days, and following Eastwards the road to Turkistan, with a slight turn to the North, he reached the Karataù mountains, and, skirting these, he returned to Djulek.

From Djulek to Fort Perovski, by Kum-Suat (50 miles above the latter), the distance by road is 63½ miles by land, and 128 by water.

Fort Perovski (Ak-Mesjed) was, before the occupation of Tashkend by the Russians, the metropolis of the Steppes and the centre of administration of the line of the Syr-Daria. It is situated on a low marshy ground. The clayey banks of the river have been here very much washed away within the last ten or twelve years, and the water has encroached to within 20 fathoms of the fort itself; so that the consequences of the inundation may be ultimately the ruin of the walls. The only vestige of the old Kokandian fort is a tower about 50 feet high, which is inside the present fort, and from the top of which a view of 13 miles of country is obtained. The summer here is dry and sultry, the temperature reaching 40° Reaumur. Hot winds frequently raise a cloud of saline sand-dust, which envelops the whole place and renders it almost uninhabitable. Man and beast are put to torture by gadflies, and the air is thick with gnats. In the fields there are great numbers of phalangi, scorpions, and tarantulæ. As rain falls here only once, seldom twice, during the summer, the fields are necessarily artificially irrigated.

* This fort is not to be confounded with the fort of the same name a little to the south of Djizak.

At a distance of $6\frac{2}{3}$ miles down stream, and a little above Kuvala, the Syr-Daria throws off an arm called the *Yany*, or, as the Kirghizes call it, the *Djany-Daria*, which flows to the South, terminating in Lake Akcha-Kul, at the head of Lake Kukcha-Dengiz, in the Kizyl-Kum sands.* Admiral Boutakof says there is evidence of this arm having once found its way to the Sea of Aral.

Sometimes in the summer the *Djany-Daria* runs dry at a point 20 miles short of Akcha-Kul. Captain Meyer, who has minutely surveyed the various arms of the Syr-Daria in this stage of its course, and who, as well as Professor Maksheyef, has written several graphic descriptions of them, ascertained from the Kirghizes of this locality that the *Djany-Daria* was, about 150 years ago, called by the Kipchaks the Inker-Daria, or disobedient River, because of its sluggish current from Kukcha-Dengiz to Lake Djailendé, close to the Aral Sea, owing to which those people could not utilise the river according to their wishes. His own observations at the same time lead him to believe that the *Djany-Daria* once issued from the Syr some way above Fort Perovski, *i.e.*, at Boktulen, whence it ran parallel with the main stream to Khan, from which place it deflected to the South-West, as it does now, and proceeded to Kukcha-Dengiz and across the Kizyl-Kum sands to Lake Djailendé-Kara-Kul, which latter he supposed to be identical with the lake at Daù-Kara formed by the waters of the Amu-Daria, or Oxus.

Failing in their endeavours to clear the mouth of the Inker-Daria, the Kara-Kalpaks, who were the then owners of this country, were obliged, about 150 years ago, for want of sufficient water to abandon these shores and to remove to the Amu. The present mouth of the Djany is shown to have originally been an irrigation canal, dug soon after the exodus of the Kipchaks by a few remaining members of the same tribe settled on the banks of the Syr. The water running into this fresh channel ultimately forced a passage to the old bed of the Inker, when this stream was called the Djany-Daria, or New River. This mouth was afterwards dammed up by the Kokandians, who established their authority there and built Ak-Mesjed in 1820; and the Russians, who have ejected them, have also endeavoured to keep it closed, but ineffectually. As Captain Meyer's observations may not as yet be known to English readers, I will make

* Kukcha-Dengiz is the central lake of three, which are connected by straits. The topmost lake is called Akcha-Kul. Kukcha-Dengiz is about 13 miles long from North to South, and about 2 miles broad. These lakes are enclosed within sandhills. The soil near the margin of the waters is some parts clay. The water is fresh. Akcha-Kul is surrounded by an argillaceous schist.

a brief quotation on the subject of the desiccated channels through which a portion of the waters of the Syr found passage a great many years ago. Whilst this matter is not irrelevant to the main subject of my paper, it refers somewhat, at the same time, to that portion of Sir Roderick's Address of last year, which dwells on the Aralo-Caspian basin :—

“The *Djany-Daria* flows by a row of ruined forts in a South-East direction to Bish-Mazar hill; then, turning off to the South, ends its course in a lake in the Kizyl-Kum sands. From Kukcha-Dengiz there are still traces of river channels, through which in former times the water flowed to the Daù-Kara locality and joined the Amu-Daria. The circumstances which confirm the truth of the traditions to this effect are, that in these beds, along the bottom of the hills, roots of reeds, lying in rows, are still distinguishable, though they are quite rotted. Similar remains of reeds are found in the beds leading from the lakes to Daù-Kara to the North-East. In the dry beds out of Lake Kukcha-Dengiz and from Daù-Kara I found quantities of fresh-water mollusks. In others the mollusks were all *oceanic*, and must, consequently, have belonged to a different period. Again, the elevation by the side of Lake Kukcha-Dengiz is ostensibly of the same formation as the hills which enclose the lakes at Daù-Kara. These hills are of sand, intermixed with mica, and rest on an argillaceous stratum. It is to be presumed that the whole of this locality rose gradually but simultaneously, and that by the process of upheaval the waters of the Syr were for ever separated from those of the Amu-Daria. That the surface of this locality has been raised, I am convinced from those same remains of reeds which occur in rows along the margins of the sands. It is remarkable that these rows are not found only on horizontal plains, but they stretch also down the slopes of the hills. If the ground had not been raised, these rows of reeds should lie horizontally, indicating the level of the water during their growth. I am of opinion that this upheaval is referable to not more than a century back, when the Kara-Kalpaks noticed the sluggishness of the current of the Inker-Daria from Kukcha-Dengiz to Djailendé. It may be that the surface is still rising; but in every case it is very evident that the *Djany-Daria* will never again flow in these channels.

I have hitherto spoken of only one tradition and of corresponding confirmatory traces left by the river itself. There exists another version which has also a verification in nature. In 1849, Captain (now Admiral) Boutakof was shown by the Kirghizes the embouchure of a river on the South-Western side of the Aral Sea, which they called the *Djany-Daria*. How was this to be explained? Let us return to Bish-Mazar hill, to which the river yet flows as it has flowed for ages. From this hill, in a Westerly direction, a dry bed is really traceable across the sands, commencing from the bend in the *Djany-Daria* and continuing to the sea itself, into which it disembogued through two mouths—the *Bas-Uziak* and *Kara-Uziak*. I did not discover any organic remains in any portion of this bed, which is distinctly marked. The Aral had evidently many deep as well as shallow inlets, now either partially void of water or preserved as swamps; they are all, however, filled with sea mollusks, and were apparently at one time the bottom of a sea. The Aral has undoubtedly retired from its Western shores, for the Kirghizes even yet distinctly recollect the time when there was water where now the land is dry. This falling back of the Aral is traceable in the dunes, where it may be observed that the mollusks are fresher as one approaches nearer to the sea and their colour is better preserved. The *Djany-Daria* did, a very long time ago, actually run in this bed, and, although based on tradition, the

statements of the Kirghizes are correct. That this course is much more ancient than the first-mentioned is marked by an absence along it of ruined forts like those that exist on the other river. One only earth-mound of doubtful origin at the Kum-Bugut dam points to the labour of man's hand in this part. By this bed the *Djany-Daria* joined the Kuvan, as is shown on old maps. My belief in the continuation to this day of the rising of the earth's surface over this extent of country is supported by the truthful observation of Admiral Boutakof that the Syr-Daria, with its mouths, is shifting more and more towards the North."

Thirteen miles below the issue of the *Djany-Daria* the Syr throws off another branch on the South, called the *Kuvan-Daria*, or Chirgaili branch, which, 200 years ago, is believed to have flowed into the Aral, but which now falls short of that sea by about 135 miles, and empties itself into the marshy lake in the vicinity of Khodja-Niaz. The cause of the interruption of its course was the enmity subsisting between the Khivans and Kokandians. The latter dammed up the river at several places near Batpak-Utkul, and so effectually cut off the supply of water from the Khivans, converting thereby the whole of that part of the country into the waterless and dreary desert which it now is. They did the same with the *Djany-Daria*, constructing the Kara-Bugut dam, ultimately destroyed by the celebrated Kirghiz Bey-Bukbar. The depth in the *Kuvan* is sometimes $1\frac{1}{2}$ foot, but it averages from 3 to 4 feet, and is from 20 to 50 fathoms wide. On both banks there are Kirghiz villages, fields, and pasture-grounds; the margins being fringed with the wild date-tree, with prickly bushes and willows. The *Kuvan* was formerly the principal channel of the Syr-Daria to the sea. During Admiral Boutakof's visit in 1845, it was still within the memory of some old men that the current of the *Kuvan* was strong enough to move rocks, whilst the *Djaman-Daria*, now the main channel, had a very feeble current.

Ten miles below Fort Perovski the Syr-Daria divides into two water-courses, the one on the right called the *Kara-Uziak*, and the chief one, that on the left, called the *Djaman-Daria* (out of which the *Kuvan* runs), which means *bad river*—so called because of its crooked and narrow stream as well as by reason of its shallowness.

At Fort No. 2 these streams unite once more, and the river then continues to flow under the name of the Syr-Daria.

The course of the *Djaman-Daria* is sinuous in the extreme, a circuit of 7 to 14 miles leading back sometimes to the point started from. The tongues of land separating the stream thus running in contrary directions are in some places not more than one-third of a mile or so in breadth. In 1853 and 1854 Admiral Boutakof noted the existence of a bend opposite a

place called Tubek-Tugai, where the river, after deflecting for about 5 miles, returned to the same spot; this neck of land, which was only one fathom wide, was broken through in the spring of 1855, and the angle in the river thus cut off now forms a pool. Irkul, another lake in the Air-Chakty Sands, owes its origin to a similar circumstance.

In the year 1863 the course of the Syr-Daria was in some places straightened by cutting across strips of land between the curves of the river, and it was the year before last a question whether the *Djaman-Daria* could not be improved, or the navigation facilitated by canalizing the Kara-Uyia. It is this part of the river, between Forts Perovski and No. 2, that presents the greatest obstacles to its navigation. Vessels drawing even so little as 3 feet of water cannot run through the only available channel—the *Djaman-Daria*, during more than two and a-half months in the year—that is when the river is flooded.

The *Djaman-Daria* is from 40 to 80 fathoms wide; its average depth is from 7 to 10 feet on the subsidence of the waters, but the minimum depth at the same period at its upper course, and over its broadest parts, is $1\frac{1}{2}$ foot. The banks on each side are thickly wooded, and the margins are lined with reeds and sedge. The bed of the *Djaman-Daria* is chiefly of a saliferous formation. There is tolerable pasturage on both sides, with thickly-populated Kirghiz encampments. The eye reposes with great satisfaction on the aspect of the country by the river. It is a great relief, after traversing the dreary and soul-oppressing steppes and sandy desert, to arrive at the narrow zone of cultivated maize-fields, melon beds, water-raising pumps, and Kirghiz “*yurts*.” Even travelling from fort to fort, where nearly all the necessaries of life, not to mention ordinary articles of use and comfort, are provided by Russian traders, it is a satisfaction to the Russians who have spent so much energy in becoming the masters of the Syr-Daria to find, at least, Kirghiz tribes settled here and there along its banks, contriving to subsist on the products which the narrow alluvial zone may be forced to yield.

The *Kara-Uziak* strikes off to the North from the Syr. It separates into two streams at $8\frac{2}{3}$ miles below its issue, and flows for 24 miles in a deep and regular bed, throwing off right and left several small arms which afterwards again unite with the main stream. Farther on the Kara-Uziak spreads into a countless number of lakes and swamps choked with reeds, which, just escaping Lake Kok-Aryk, drain off their waters at first into several distinct channels having one common direction, and

ultimately concentrate in a single bed by which the *Kara-Uziak* proceeds $53\frac{1}{3}$ miles to Fort No. 2 in the form of a regular and deep river.

The island formed by the partition of the river into the Djaman-Daria and Kara-Uziak branches, is called *Kosh-Kurgan*; it is 74 miles long by $8\frac{2}{3}$ broad. The Djaman and Kara-Uziak are connected by a stream which flows through this island, called the *Kitkan-Su*, $4\frac{2}{3}$ miles from the point of partition. Here the Djaman-Daria is at its shallowest, just above the spot where the *Kitkan-Su* flows into it from the Kara-Uziak. In the course of time it is expected that the principal volume of water will be discharged into the Djaman through the *Kitkan-Su*, or Uziak, and that the former will be impassable from the Syr for the bar occasioned by its sluggish current and the rush of the water through the *Kitkan-Su*. The latter is from 3 to 5 fathoms wide.

The *Kara-Uziak* receives the greater portion of the waters from the Syr-Daria. After filtering through the reeds in one stage of its passage, and leaving in these the sediment which gives its waters their turbid and yellow appearance, the *Kara-Uziak* concentrates in one bed, of which the banks and bottom are rendered firm by the roots of reeds and by marine plants, and flows perfectly transparent until its junction with the Djaman-Daria. There its clear waters reach almost across the entire breadth of the Syr-Daria, preserving a distinct outline from the muddy stream supplied by the confluence of the Djaman-Daria. Three or four miles below Fort No. 2 the waters of the Syr-Daria degenerate again into the uniform muddy hue of the Djaman.

The average depth of the *Kara-Uziak* is 4, 5, and 6 fathoms, the breadth in its lower course is from 40 to 60 fathoms.

The density of the reeds, and the rapidity of the current in the *Kara-Uziak*, render its navigation almost a matter of impossibility. Its bed cannot be cleared, and drawing off, as it does, most of the waters of the Syr-Daria (its bed being so much deeper than that of the Djaman) it causes the Djaman to become so shallow that towards the autumn of the year no vessel can pass through it. At the same time evaporation here is so great that the bulk of the waters of the *Kara-Uziak* escapes in the process. The inundations of this branch cover an area of 2000 square versts (nearly 287 square miles). The banks of the *Kara-Uziak*, according to Captain Meyer, are totally unfit for cultivation, so that even supposing any attempt to clear this channel for navigation proved successful, it would be the signal of the ruin of agriculture along the whole of the Syr, because to make the Kara-Uziak a practicable waterway

all the other channels will have to be closed, when the rush of waters through the *Kara-Uziak* would cause a great fall in the level of the Syr, a circumstance which would prevent the irrigation of the fields above.

Thirty or forty years ago the *Kara-Uziak* was nothing more than an irrigation canal dug by the Karakalpaks.

Twenty miles above Fort Perovski the Syr throws off another branch on the right, called *Ber-Kazan*. The surrounding land is submerged at high water after the flood has supplied several lakes to the North-West and the Bysh-Aryn canals. This stream ultimately effects a junction with the *Kara-Uziak*.

At $1\frac{1}{3}$ mile above the *Ber-Kazan*, and 50 fathoms from the margin of the Syr, are situated the ruins of a Kokandian fortification overgrown with brushwood, and not, therefore, distinguishable from the banks.*

Fort No. 2 (or Karmakchi) is about 117 miles below Fort Perovski, by road along the *Kara-Uziak*—that is about midway between the latter and Fort No. 1. The road passes by an almost continuous swamp where game of all kinds is very abundant. Immense flocks of wild ducks, geese, swans, and other water-fowl, literally cloud the skies when they rise disturbed from the lakes and pools. Pheasants may be observed under the cover of the prickly plants on the dry ground. Herds of “*Saigaks*” (Scythian antelopes) perpetually cross the path of the traveller, and wild boars and tigers still find shelter amidst the jungle notwithstanding the continued efforts to exterminate them for the premium set on their skins by the Russian authorities, and the frequent firing of the reeds. At this stage the “*Saxaùl*” grows in thick but short stumps; it is very good as fuel, but it is apprehended that the quantity of it growing along the *Syr-Daria* will fall short in a few years of that required for the supply of the flotilla. The firing of 12,000 pounds (190 tons) of this fuel in 1867 by the Kirghiz marauder Sadyk was a severe punishment to the Russians. Sadyk—a partisan of the Ameer of Bokhara—is still at large; he continues to this day to harass the Russians on their advanced line.

The banks of the *Syr-Daria* below Fort No. 2 are mostly depressed, and consist of saliferous and arenaceous loam. In some parts, however, they are precipitous—as at Tasty-Djar and at Ak-Djar, on the South side. At the first-named point there are strata of reddish sandstone alternating with gravel. The elevation of the earth is here about 100 feet. The mounds on the opposite bank, rising 80 feet, are of loam. There is, too,

* From the confluence of the *Kara-Uziak* and *Djaman-Daria* at Fort No. 2, the *Syr* is navigable at all times when it is not covered with ice.

a succession of sandy hillocks studded with tamarisk and prickly plants. All along the river extends a zone of jungle with grass of great density and succulence, which narrows towards the mouth of the river where the Kizyl-Kum sands approach the Delta and all around is consequently bleak and barren.

Fort No. 1 (or Kazaly) is the first point on the Syr-Daria line from the mouth of the river. It stands on the banks $46\frac{2}{3}$ miles from the embouchure. Immediately under it are moored the steamers and barges of the flotilla. In the settlement around it is carried on a trade in raisins, filberts, pistachio nuts, flour, and silk and cotton stuffs. The traffic in the neighbourhood of the fort is considerable. Caravans cross the Syr at Uchurgo, Murtuk, Mailibash, Chirik, and Kame-Kalagan,—all within the *rayon* of the fort, and distant from it respectively 11, 28, 30, and 107 miles in the order in which they are named. Higher up the Syr caravans from Bokhara and Tashkend traverse the river at Ush-Kayuk, almost in the meridian of Turkistan, whence they proceed along the Myn-Bulak River by Lake Telekul-Tata,—leaving Fort Perovski far to one side. The distance from Fort No. 1 to Fort Perovski is $233\frac{1}{3}$ miles by road along the Kara-Uziak. This track borders the steppe which is relieved by small undulations covered with reeds and prickly shrubs.

At the embouchure of the Syr-Daria, the banks are composed of saliferous clay. A line of grey and perfectly bare heights is observable on each side about 13 miles above Raim, beyond a deep border of dense jungle. These heights are from 150 to 200 feet above the level of the river. Between these elevations on the North side of the river, where they are more numerous, is the little valley of Aigerik, where the Kirghizes sow millet and barley. This valley is 20 miles distant from the Syr-Daria both at Raim and Fort No. 1.

On the left bank of the river $14\frac{2}{3}$ miles below Fort No. 1, are the ruins of a Khivan fortification Djan-Kaly abandoned and demolished towards the end of 1847.

The shoals in the river commence within about 10 miles of the Aral, and increase in number and dimensions towards the mouth of the Syr-Daria where the river opens out into three estuaries or *limans*. Of these the Southernmost, or the *Shavarli*, estuary opens between the left bank of the river and the island of Kos-Aral; the central estuary lies between this island and that of Surato, and the Northern estuary occurs between the latter island and the Unadym neck of land.

The principal mass of waters separating into three courses pours into the central estuary. At the entrance of all three of these estuaries lies a bar which is composed of a deposit of mud

and sand washed down by the current and stopped by the action of the sea; the former bringing down sedimentary matter, and the latter washing up the sand during the prevalence of North and North-West winds. This bar is not wide, but it is found to be a great obstruction to steam navigation. The greatest depth over it is not more than 3 feet.

The North and South estuaries are so shallow and so entirely choked with reeds that they are quite impassable. Since 1847 the delta of the Syr-Daria has changed very much. During an eight years' experience of it, Admiral Boutakof observed great variations. The South estuary was silted up and the waters were altering their course into fresh channels farther North, whilst a number of islands springing up through the formation of shoals and accumulation of reeds, willow-trees, and all sorts of deposit, aided towards the diversion of the stream.

At a short distance below Fort No. 1, the Syr-Daria sends off streams right and left, which supply the lakes *Raim*, *Djelangatch*, *Aigerik*, and *Kamyshlybash*. The two first named are at the bottom of either side of an elevated tableland 200 feet above the level of the water; this elevation occurs at $1\frac{1}{3}$ mile from the margin of the river.

Some seventy years ago, when the Kara-Kalpaks inhabited these localities, they constructed a dike 10 miles long, parallel with the right bank of the Syr-Daria opposite the former Aral fortification (about 57 miles by water from Fort No. 1.), which served to prevent the overflowing of the river here. This dike was ruptured in 1847, when the outlying lowlands were at once submerged, but it was repaired by the Russians prior to the removal of the Raim Fort to Fort No. 1, the lands were reclaimed and meadows and vegetable gardens reappeared.

When the Syr-Daria swells with the snow waters from the Thian-Shan the flood reaches Fort Perovski suddenly, but it is some time before the waters rise in the river below the confluence of the Djaman and Kara-Uziak, owing to the lakes and pools in the latter, and to the numerous channels that have first to be fed. In the same way the flood subsides at Fort Perovski long before the Syr-Daria in its lower course has discharged its superfluous waters. Thus the lakes caused by the flooding of the river act like reservoirs, giving gradations of rise and fall below the island of Kash-Kurgan. Perhaps this circumstance might suggest and afford the means of rendering the entire course of the river navigable at all times, except in the winter, when it is frozen. As it is, the Syr-Daria is unserviceable to all intents and purposes; it is not (because it cannot be) employed as a highway for commerce. If Admiral Boutakof, who is now the Governor of the Syr-Darian district of the new province of

Turkistan, can make the Syr-Daria navigable for steamers and other craft from the Aral to Khodjend it would indeed be the making of the province, and there would be no occasion for discussing the question—started in Russian papers—of a railway from Orenburg to Tashkend, should funds and other means even be forthcoming for the enterprise, after the completion of a line from Samara to Orenburg.

At Fort No. 1, the difference between the highest and lowest levels of water is about 7 to 8 inches.

Strictly speaking there are no lakes on either side of the Syr-Daria; there are only a great many depressions in the land which fill with water from the mountain streams and “Kara-Su;” these hollows are also fed by channels which conduct the water from the river during the floods. The Kirghizes, however, make no distinction between these and lakes proper, and dignify them equally with the name of “Kul” (lake). In many of these the water is preserved only during the summer, and when dry enough for the purpose they are utilised for cultivation.

“Kara-Su,” or Black water, is a generic term for sluggish streams fed from springs and marshes and which never freeze.

II.—*Tributaries.*

Throughout the whole surveyed course of the Syr-Daria, that is from Baildyr-Tugai downwards, that river has only two affluents: the *Arys* and *Sauran-Su*. Those higher up still of any important dimensions are the *Chilik*, *Keles*, and the *Chirchik*, on the right bank of which is situated the town of Tashkend; the other rivulets issuing from the Southern slopes of the Karataù Mountains, such as the *Djedéli*, *Satyn-Sai*, *Achalgandy*, *Sert-Su*, *Karasakty*, *Initchké*, on which Turkistan is situated, and the *Karachik* lose themselves in swamps before reaching the Syr-Daria, and the latter runs a course of 460 miles without receiving a single tributary.

The *Arys* river has its source in the Kulan range of the Karataù chain, and the valley of this river, like that of the Tersa farther East, separates the Karataù from the Urtaktaù Mountains, the latter terminating in an abrupt spit 2000 feet high over the river below the mouth of the *Arys*. The *Arys* has an absolute elevation of 1950 feet; it has several affluents from the mountains on both sides. The largest of these affluents occur in the mid course of the *Arys* after passing Yaski-Chu settlement; they are the *Baroldai* on the right, and the *Mashat* and *Badam* on the left. Chemkend stands on the last named. A great many other streams run towards the *Arys*,

without however reaching it; they are led off into irrigation canals. The lower course of the *Arys* extends about 47 miles from the mouth of the *Badam* to the Syr-Daria. Here its current is slow and its depth gradually greater from the ford at that part, and the *Arys* becomes accessible to steamers of 4 feet draught, for 2 miles up. Copses of “Djida” (*Eleagnus Angustifolium*), and prickly shrub (*Caragana jubata*), and “Turanta” (*Populus diversifolium*), clothe 13 miles of its banks on both sides, from the mouth.

The *Chirchik*, or *Chatkal*, as it is called in its upper course, is formed by the confluence of the *Kara-Kyspak* and *Kara-Kuldja*, flowing from the meridional range or mountain knot between the Urtak-taù and Namangan Mountains, from both of which the *Chatkal* receives feeders at intervals of about every 2 or 3 miles. The current of this river is extremely rapid. Its fall from the mouth of the *Kara-Kyspak* to Chipash-Kurgan, a distance of 20 miles, is 750 feet; there are no fords across it. The depth, too, is very great, and the breadth in the main channel is from 20 to 25 fathoms. But with all its rush the current of the *Chatkal* is smooth and not interrupted by rocks, so that it serves admirably for floating down timber to Tashkend.

Throughout a course of 180 miles from the *Kara Kyspak* to Tashkend the fall of the *Chirchik* is not less than 5000 feet. It flows within 5 miles of Tashkend, issuing from the mountains at about 7 miles above Niaz-bek,* through a very narrow and impassable gorge. The Tashkend road, instead of passing through this gorge, trends across the mountains, which shows that the river here must break through precipitous clefts of the range. In the Tashkend Valley the *Chirchik* flows between steep banks, and although it is led off into a number of irrigation canals, there are still no fords. South of Tashkend it spreads out into wide marshes 7 miles from its mouth, from which the river issues again in one bed, 40 fathoms wide, fordless, and so disembogues into the Syr-Daria.

In consequence of these marshes the *Chirchik* is navigable only below them, that is, 7 miles up from the Syr. If they were canalised, the rapidity of the current alone would still be too great a difficulty for steamers to overcome.

III.—*Ruins.*

There are a great many tombs, in the shape of beehives and square towers, built of clay or brick, or both, between Fort No. 2

* Niazbek is a fort on the *Chirchik*, distant 10 miles from Tashkend to the South-East. It commands the canals by which the fields of that town are irrigated.

and the embouchure of the Syr-Daria. These are mostly situated along the banks and are in a dilapidated condition. There are likewise several cemeteries of ancient date. Admiral Boutakof interrogated the Kirghizes as to the time to which these isolated tombs and cemeteries belong, but he could gain no information on the point; and yet to one of the tombs—that of “Batyr” Kharkut, on the right bank of the Syr-Daria, 13 miles below Fort No. 2—the Kirghizes had themselves built an additional wing on being struck with a recollection of the length of the late “Batyr’s” legs, which they thought the former dimensions of his resting-place could not admit of being stretched out to his comfort.

Captain Meyer mentions several pieces of white marble which he saw lying about near the ancient tombs by the Syr. He describes them as quadrangular pillars, 1 yard long by 5 inches across the section of the square. One side of these pillars, he says, is carefully polished and bears ornamental inscriptions and Arabic characters. The fragments of these being scattered about, he could not make out any complete word of the inscriptions. One stone, he says, bore characters which were unintelligible to him; but he thinks they may have been figures effaced by time. From the small number of these pieces of marble lying about, they could only have been the ornaments of some edifice. He relates the following legend in connection with these pieces of marble:—“Batyr,” or Khodja-Khorkum, feeling conscious that his existence was about to terminate on this earth, galloped on his miraculous steed to the land of the Prophet, and returned the same night with these stones for his tomb. From this Captain Meyer concludes that the marble is of foreign extraction, and that the people who once lived here had relations with populations enjoying Arabic cultivation. The erection of the ancient tombs found about here was, no doubt, contemporary with the existence of the town of Djankend.

The ruins of Djankend lie at a distance of 14 miles from Fort No. 1, on the left bank of the Syr, and about 3 miles off the river. They consist of a quadrangular wall of burnt brick, with a trench running all round. The Northern and Southern sides are 150 fathoms long, and the Eastern and Western 100 fathoms. The wall on the South side has crumbled away and filled up the trench. The height of the walls is 4 fathoms and the thickness of the basement 5 fathoms. At the North-Western angle the wall is higher and even thicker. Here must have been the citadel. In several places the walls project in such a manner as to have enabled the holders of the place to throw missiles at assailants venturing into the trench. There is an entrance into the interior

of this quadrangle from each side; the space enclosed is filled with heaps of bricks and with earthmounds rising above the level of the walls. Outside this enclosure, on the South-Western side, is or was a cemetery, and on the Western and Northern sides the ground within a radius of about 2 miles is covered with "kurgans" or hillocks, which appear to contain the ruins of dwellings of all kinds; now they are overgrown with prickly shrubs. These hillocks in some places run in continuous lines, and the excavations which have been made here by Mr. Lerche, of the Imperial Academy of Science of St. Petersburg, by Mr. Vereschagin, and others, have led to the disclosure of skeleton-houses and a long row of what are believed to have been shops. Large quantities of burnt or glazed bricks of very superior quality have been dug out by the Kirghizes, and some of them have been used by the Russians in the construction of their forts on the Syr-Daria. Many curiosities have been unearthed in this place, such as glass objects, gold and silver coins, earthenware cups and vases, architectural ornaments, some of which, as well as a great number of bricks, were found to have a coating of blue enamel and inscriptions in relief; but from all these no clue has been obtained by which the foundation of Djankend might be attributed to any particular people. A comparison of the relics here found with such as exist in Samarcand, Sogd, and Merv, might perhaps lead to some conclusion. There is a tradition that this place was at one time the residence of certain "Kizil-Bashas" (as the Kirghizes call the Persians), or kings of this country. The last of these, it is said, married the daughter of a neighbouring prince and put her to death because of the impartiality with which she lavished her affections. Her father, who was a conjuror or "canny" man, avenged his dear daughter's death by visiting his selfish and cruel son-in-law's country with serpents, by whom the latter and all his people were very soon duly devoured. The Kirghizes believe that the whole of this place is still infested with that vermin; but, with the exception of one serpent, measuring a yard and a half, which was found killed, none have ever been seen there by the Russians.

IV.—"*Aryks*," or *Canals*.

The "aryks" (canals) and dikes along the Syr-Daria, as those of the Oxus, are the principal supports of settled life by the river. The level lands on the right and left banks, where the sands of the desert do not extend to the very river, are intersected in all directions by "aryks." These "aryks," when flooded, have always proved to be the greatest impediments in

the way of Russian columns bent on attacking any forts. Their great depth and width render them generally impassable. In any places not inundated by the overflowing of the river there could be no agriculture but for these water-conduits, and in olden times, as already mentioned, it was sufficient to have stopped the supply of water, by damming a water-course, to have converted a fertile oasis into an almost barren desert. At several places along the Syr-Daria there are still traces of entire systems of irrigation now forsaken. It is evident that at these places there must have been in remote ages large settlements and cities, in which everything must have worn an appearance that would contrast strangely with the present aspect of those localities. And this change has doubtless been brought about more through the agency of warring man than by natural causes. Perhaps even if the waters of the Syr-Daria had from the first been allowed to run their natural course instead of diverting them into a variety of artificial channels, it would to this day have pursued its original way into the sea of Aral by the Djany-Daria. If it is a fact that the alteration of the course of the Syr-Daria from Fort Perovski to its mouth is attributable to the upheaval of the soil, it is I think no less admissible that nature has been largely aided by man in controlling the stream. Certainly the great number of dams and irrigation systems, dating speculatively from 150 to 200 years ago and upwards, appear to have been contemporaneous with the diversion of the streams.

About the most remarkable irrigation systems are to be seen between the river at Djulek and the Western extremity of the Karataù, on a level known as the Misheúli-kum Sands. Here is a hollow, called Ak-Aryk, commencing from the banks of the Syr at Ak-Djar settlement in the form of a system of canals now unused. From Sar-Kuduk this hollow becomes a deep ravine, reaching to the Sary-Kul Lake at Djulek. Besides this hollow there is a large canal, called the Tuimen Aryk, which runs parallel with the former as far as the Kara-Murun Hills—the so-called Westernmost ramification of the Karataùs. These systems served at one time for the irrigation of the fields; they now preserve only the traces of their former selves. At some earlier period of this country's history there must, it seems, have been life and animation here, judging by the great number of ruins of forts and structures, besides the three large tombs "Uk-Chata," not far from Djulek. The most considerable forts are those of Tokbura and Sulak-kurgan, half-way between Djulek and Yanykurgan. There are also the remains of an ancient town on the Syr, at the mouth of the Tuimen-Aryk. Now, all the country

round and about is an arid wilderness. The only spots where there is any water in pits are Kuk-Irein and Sar-Kuduk, with other small springs fed, in all probability, by the accumulating snow-waters in the Taraigyl. Some such occur also along the road from Djulek to Yany-Kurgan.

The range of country between the Western extremity of the Karataù and the salt lakes in the meridian of Fort Perovski, is said to be literally scattered with ruins of ancient settlements. This extent also is now a waterless desert. Even the wells that are there are dry. Twenty miles below Fort No. 1 there is, among other irrigation canals, that of Bouðjidé. Captain Meyer, who surveyed this part in 1861, and who had thus an opportunity of judging of the changes to which the country had been subjected, was astonished at the dimensions of this "wonderful achievement of man's hands." It is immense. He followed the canal for 47 miles, and then even did not come to the end of it. At that extent it loses itself in the dunes of the Aral. Its depth was from 2 to 3 fathoms, and breadth from 3 to 5. It is very judiciously laid along the base of an elevation, so that the outlying fields might easily have been irrigated without recourse to artificial means for raising the water. The water of the Syr now reaches only 5 miles into this "Aryk," beyond that the hollow is choked up with sand for two-thirds of a mile. From a comparison of the bricks in the ruins of the ancient town of Djankend—7 miles from the mouth of this canal—with those in the ancient tomb of Big-min-aka, this monument of bygone days must have belonged to the period of the existence of Djankend.

V.—*Climate, Soil, Animals, and Natural Products.*

To within almost the meridian of Tashkend only a very narrow margin along the Syr-Daria is capable of being cultivated. The steppe on both sides of the river from there becomes more and more barren and saline towards the West. The best spots are North of the Arys, by the Arystandy rivulet between the Chilik and Turkistan, and South of the Arys from the Turlan pass across the Karataù mountains, leading from Turkistan to Cholak. South of the Arys the soil of the Steppe at the foot of the mountains is all over the same; it produces the same kind of vegetation for a great distance, and this consists of a variety of herbs growing densely, of the "Alhagi Camelorum" and other kinds. There is no brushwood. Under cultivation, the productiveness of the Steppe varies according to the local conditions of irrigation.

As to the fertility of the valley generally of the Syr-Daria, the statistics given by a Russian agricultural priest residing at Fort Perovski, on the harvests gathered on the alluvial plains bordering the river all along its course, are very startling. Even so low down as at Fort Perovski wheat is said by him to yield 70 fold, barley 100, millet 500, "and these," adds the same local authority, "are only moderate figures." Later and *reliable* authorities, have however stated the general crops raised by the Syr-Daria to vary from 2, 3, and 6 fold. Here is a wide discrepancy.

In places more distantly situated from the river, but still geographically within its valley—such, for instance, as the neighbourhood of Turkistan—the soil is not so good. The crops along the river are not unfrequently devoured by the scourges of Steppes, the locusts, and destroyed by the overflowing of the Syr. In such cases a second harvest of barley or millet is said by some to be sown, and gathered in October. There are here and there small plantations of cotton and madder. The Northern limit of the cotton plant is at Mankend, near Chemkend, although it has been made to grow still farther North, at Almaty or Vernoë, and even at Guriëf at the mouth of the River Ural.

As an industry, the rearing of silk-worms is pursued only at Khodjend and Namangan, along all the Southern tributaries of the Syr and at Margilan. These are the three centres of this industry, besides Kokand, so that it is limited to the Ferganah valley. The mulberry-tree grows at all the settlements along the Chirchik, but in the province of Turkistan the silk-worm is reared only at Tashkend as an experiment.

Rhubarb, liquorice-root, wild chicory, and madder, with other roots from which dyes are extracted, are found on the Syr. Mr. Severtsof has discovered "Asafoetida," and many varieties of flax and hemp, with very firm staple. The fleece is soft and silky.

The beehive has not yet been introduced on the Syr-Daria, but it is a question whether this industrious insect might not be acclimatised on its banks and made to suck honey from the scented flower of the Djida between Djulek and Fort Perovski.

The river is well stocked with fish, such as the sturgeon, silurus, carp, chub, miller's thumb, "sandre," bream, pike, perch, and a species of herring.

The animal kingdom along the Syr-Daria is represented by the striped tiger, which Humboldt says is of the same species as that of Bengal, and the wild boar. In the adjacent Steppes are the wolf, fox, and hare, and farther to the East the "kulan"

(a wild horse). Around Fort Perovski there are the "Saigak," antelope, and—burrowing in saliferous districts—the Siberian marmot and the jerboa.

The feathered tribe is represented by the pheasant and the migratory swan, goose, duck, crane, heron, pelican, cormorant, sea swallow (tern), snipe, starling, and lark. The birds of prey are the common eagle, gerfalcon, &c. Among the reptiles and insects are scorpions, tarantulæ and phalangi, and during the summer, swarms of locusts, gadflies, gnats, and thrips. The locusts are providentially followed by flights of small birds, natives of Bokhara, who feed on them.

The summer heats in the valley of the Syr-Daria reach to 35° and 40° Reaumur, and in winter the thermometer rarely stands so low as at 10° Reaumur. Snow lies on the ground three months in the year, so that relatively to European countries of the same latitude the winter in these parts is severe; all the rivers freeze, excepting the "Kara-Su," and snowstorms are of frequent occurrence.

The strong exhalations from the river banks are unhealthy, and would be very injurious but for the constant aerial currents which save the people from fevers. The summer heats are particularly fatal to camels, although they first show symptoms of distemper when the temperature begins to cool. About that time, *i.e.* in August, the cattle are generally stricken with the plague.

The prevailing winds are those from the northern points of the compass.

The banks of the Syr-Daria are peopled by wandering Kirghizes. A settled population is found only in the towns situated along the highways of traffic, *i.e.* in that portion of the valley of the Syr-Daria where Tashkend is the nucleus of industries. It is true there are some aùls of "Iginitches" or cultivators of the soil, who eke out an existence through their labours in the fields as low down as Djulek, but they are not numerous, as the only lands that yield a return for the energies expended upon them are the narrow strips immediately by the margin of rivers. Below Djulek the Syr-Daria is singularly bare of population. The Kirghizes who roam over the country between the Syr-Daria and the Southern slopes of the Karatau mountains belong to the middle horde. But there is another tribe, that of the Kungrad Kirghizes, who nomadise here; these are the best to do, having more comfortable "yurts" and larger herds of cattle than the others.

The strength of the Aral Flotilla in 1866 was as follows:—

				Numbering.	Guns.	H.-power.	Tons.
Steamers	..	..	..	3	8	100	359
Steam cutter	..	..	..	1	2	12	16
Floating dock	..	..	..	1	0	4	172
				5	10	116	547

besides a number of barges, boats, &c. The steamers are from 12 to 40 horse-power each, but as they were built for these waters before the Russians were acquainted with the character of the Syr-Daria, they are found not powerful enough to contend with the current, and they draw too much water for its navigation. A new steamer and three iron barges, each capable of carrying a cargo of 150 tons and drawing only 2 feet, were in the same year placed on those waters, and one more steamer was last year being constructed in England for service there. Another boat was also purchased for the Syr-Daria of 70-horse power, 150 feet long, which is calculated to make $11\frac{1}{2}$ miles per hour up stream, and to tow barges laden with 150 tons of cargo at the rate of $3\frac{1}{2}$ miles an hour. The greatest difficulty, that of the shallows of the Djaman Daria, the Russians will endeavour to overcome by the employment of these flat-bottomed boats. One more difficulty, that of the scarcity of fuel along the river, still exists. Admiral Boutakof says that the 'Saxaül' will shortly be all exhausted, and that even while it lasts steamers cannot take in a sufficient supply of it for any long passage, because the crooked and heavy logs of that stunted tree occupy too much space in the hull of a boat. It is reported that layers of coal have been discovered in the slopes of the Karataü, on the Great Bugun River, within 60 miles of Chemkend, in the vicinity of Chulak, near Turkistan. These Colonel Tatarinof has been engaged in working. But the great, almost insuperable, difficulty of conveying coal to the river, even if it should be found to exist in these mountains in sufficient quantities and of a serviceable quality, is a great drawback to navigation on the Syr-Daria; this difficulty is owing to the absence of forests, and without timber no coal found at a distance in the mountains could be made available.*

* Coal has been recently discovered in the mountains near Khodjend, and is said to be supplied in sufficient quantities to supersede the use of any other fuel in that town.

APPENDIX.

LIST of ASTRONOMICAL POINTS along the JAXARTES, from FORT PEROVSKI to BAILYR-TUGAI. Determined by ADMIRAL BOUTAKOF.

NAMES OF PLACES.	Latitudes.			Longitude from Greenwich.			Deviation and Inclination of the Magnetic Needle.			
Fort Perovski	44	50	36	65	27	24	6	13	61	34
Fort Djulek	44	16	53	66	23	3	5	47	61	5
Ak-Cheganak	43	57	14	66	51	33	4	19	60	45
Ruins of Din-Kurgan	43	51	59	67	10	44	4	29	61	0
Ferry at Utch Kayuk, oppo- site to ruins of a Kokan- dian Fort	43	14	12	67	47	14	4	13½	60	50
Djessyn - Kurgan, on the Arys, 11½ versts from the ruins of Otrar	42	45	56	68	15	10	..		..
Sazan-Tugai	42	26	22	68	12	12	..		..
Bailyr-Tugai	42	1	40	68	8	17	..		..

TABLE OF CORRESPONDING LOCALITIES, ON BOTH BANKS, FROM FORT PEROVSKI UPWARDS TO BAILYR-TUGAI.

[Places marked * are astronomical points determined by Admiral Alexis Butakof in 1863.]

Left Bank (South).

Kara-Kuj.

Torp-tiubek locality.

Kel-tup locality.

Ken locality.

Kermek-Sada locality.

Boldakty locality.

Kanymchik Island.

Hodjon locality.

Djaly locality.

Anyapamin locality.

Turaugita tomb.

Kara-gul locality.

Fine meadow.

Sandy mounds.

Saxaül.

Right Bank (North).

Fort Perovski,*
Sabalak locality.

Former Birubaef post.

Ruins of Mama-Seyt fort.

Kanda-Aral locality.

Kum-Suat locality.*

Kara-Elza locality.

Kuidji locality.

Sarakty locality.

Sary-Cheganak.

Kal-Murun.

Maili-Kum.

Sun Karly.

Left Bank (South).

Bukhtuhá.
Bushagan.
Adidarty.

Ak Djippé.
Kolgan-Syr.

Koz-Celgi.
Kosh-Belgi tomb.
Tokyr-Kum.
Bokù-Ata tomb.
Bekpesyk sands.

Turangil sands.
Bil-Turangil ditto.
Kargaly Lake.
Kiik-Kurgan.

Ak-Cheganak.*
Bish-Kazak.

*Fort Balapau.***Left Bank (South).*

Kuyuk locality.
Karai.

Kuk-Djida.
Kokais tomb.

Bish-Turanga.
Apanych-Tugai.

Djinam-Mula tomb.
Chermaükty.

Kuilaka.
Kuilaka-Ata tomb.
Kizi-Utkun.
Ak-djar.
Tiura-Kul tomb.

Tuguzken (off the river.)
Former Fort Ak-kala.
Ditto—Djadygyr.

Sauza.
Myrza Tugai.

Myrza-Kul Lake.
Kazak-Bai.

Right Bank (North).

Fine meadows
on both banks.

Fine meadows
on both banks.

Fine meadows
outside sandy
mounds to Ak-
Cheganak.

Saxaùl.

Sand-mounds.

Saxaùl.

Saxaùl.

Meadows.

Course of river.

Sand-mounds.
Meadow.

Meadow.

Ak-Djar.

Tar-tugai.

Kuk-Cheganak.

Karabatyr.

Burtata port.

Kara Murun Mountains.

Fort Djulek.*

Kaüstyn-Kum sands.

Kaüz-Tugai.

Tarpi-Kum sands.

Mesheuli.

Djanama.

Baba-Seyt.

Ditto, tomb.

Yu Lake Ak-kul.

Bish-Ala Lake.

Miuz tomb.

Bish-Data.

Katy Kizik.

Tumeu-Aryk.

Almaly-Tugai.

Burkul Lake.

Vraly-Tugai.

Right Bank (North).

Ruins of Yany-Kurgan.

*Ditto Din-Kurgan.

Djindjai tomb.

Kaigak.

Djalangatch.

Kuk-tol Lake.

Kargaly-Tugai.

Miyami.

Kaükty.

Kamyn Mula tomb.
Arayat.

Apraim Kul Lake.
Kyzyl-Ata mound.

Kyzyl-Bair.
Ak-Tash Mula tomb.

<i>Left Bank (South).</i>		<i>Right Bank (North).</i>	
Keliu-Tiuba mound.	Jungle.	Djanam-Kul.	
Abyz-tiuba.		Sarabai-Tugai.	
Abyz-Mullah town.		Imbech-Alta tomb.	
		Imbech-Kul.	
		*Savrun ruins.	
Kair-tup.		Sary-Kamys.	
Tuz-Baie mosque.	Jungle on both		
Kurgau-kul lake.	banks.		
<i>Aldami-Tugai.</i>	Jungle.	Ak-Yar.	
Bazdata (Tinra Tam) mosque.		Syrgau-Tugai.	
		*Turkestan.	
Arpa-Suip Kun.	Jungle.	Kyr-Krank.	
Kugol-tup.		Kuplin-tup.	
Yamau-kul Lake.		Kulak tungai.	
<i>Ak-kum.</i>		Beglik-Aral Island.	
		Utch Kaik Fort.*	
Ak-kul-Tugai.	Jungle.	Ili Bai tomb.	
		Dim-Uzak.	
Djaman-Tugai.		Sary-Chungul Tugai.	
Alagul-Tugai.			
Balta-Tugai.	Meadows and	Yalan-tuz.	
	jungle.	Dji-Chalarsty.	
		Chayatom-Kinu.	
Kara-Chokul-Tugai.		Utch-Kaik.	
<i>Sagindyk-Tugai.</i>		Kuchan Asar-Kul Lake.	
Isen-Tugai.		Kanly.	
Maya-kum mound.		Kara Sengir.	
	Sand-mounds.	Kuk-Cheganak.	
Bayalytch-Tugai.		Ruins.*	
Suyaiu-Tugai.	Meadows with	Djesin-Kurgau.*	
Chingildy.	jungle.		
Sengildy-Tuga.		Sheity-taù.	
Kukchu-Tugai.		Kuk-Cheganak.	
		Arkundy-Tugai.	
Kuk-Sarai.			
Baijan-Tugai.		Urunduk-Tugai.	
Baiten.		Djingaldy-Mulah mosque.	
<i>Sayau-Tinhya</i> Mound.			
Sazau-Tuga*.	Jungle.	Baigaska-Kul Lake.	
Saza-Tuga.		Sasyk - Mulah (Aulie) mosque.	
	Salines.	Kuk-Karkara.	
		Karka-Tugai.	
		Munchakty.	
		<i>Sasyk-kul</i> -Tugai.	
Uzun-Aral-Tugai.	Jungle.	Ferry.	
Ruins, Iskillé.		Bugai.	

<i>Left Bank</i> (South).		<i>Right Bank</i> (North).	
<i>Kuk-Turangil Tugai.</i> <i>Ak Suat Tugai.</i>	Pasturage.	Buzaga-Tugai.	
		Yanama-Tugai.	
Bair-Kurgan Fort. Suat-Tugai.		Kizyl-Djangil.	
		Kara Sengü-Tugai.	
Baildyr-Tugai.	Pasturage.	Randy-Tugai.	
		Latitude 42° of Greenwich.	
Longitudes 66° 30' and 68° 51' (about) embrace Fort Perovski and Baildyr-Tugai.			
Longitude of Perovski about 45° of Greenwich.			

